

New Bugs On the Block: MDROs in 2011

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Conflicts of Interest

The presenter has no relevant relationships
with commercial interests to report.



Objectives

By the end of this presentation, participants
will be able to:

- ✓ List at least two multidrug-resistant organisms
- ✓ Describe a recent MDRO outbreak
- ✓ Discuss prevention and control strategies



Outline

- MDRO definition and organisms
- MDRO outbreak
- Prevention & control strategies
- Current & planned MDRO surveillance
- Questions and answers



What are Multidrug-Resistant Organisms (MDROs)?

- Organisms with decreased susceptibility to multiple classes of antimicrobial agents
- Most often bacteria
- Commonly are healthcare-associated infections (HAIs)
- Increasing prevalence in community

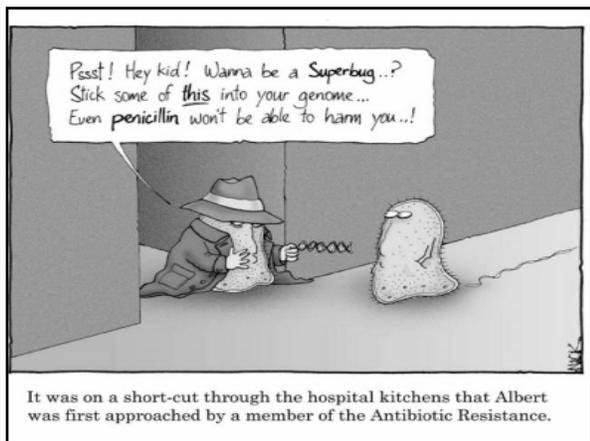


The Organisms

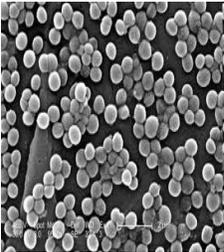
Alphabet soup!!!

- MRSA (CA-MRSA and HA-MRSA)
- VRE
- VISA
- VRSA
- MDR GNB: ESBLs, KPCs, and CREs





MRSA

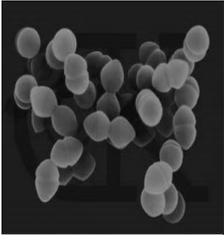


- Methicillin-resistant *Staphylococcus aureus*
- Resistant to beta-lactam antibiotics including:
 - Methicillin, oxacillin, penicillin, and amoxicillin
- Healthcare-associated (HA)
 - USA100 and USA200
 - SCC I, II, and III
- Community-acquired (CA)
 - USA300 and USA400
 - SCC IV



VRE

- Vancomycin-resistant *Enterococcus*
- Can colonize the intestines and female genital tract
- Can cause infections of the urinary tract, the bloodstream, or of wounds associated with catheters or surgical procedures



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VRSA

- Vancomycin-resistant *Staphylococcus aureus*
- Vancomycin minimum inhibitory concentration (MIC) $\geq 16 \mu\text{g/mL}$
- Isolate must be confirmed at MDCH laboratory
- Resistance is acquired from VRE and is transferrable



VISA

- Vancomycin-intermediate *Staphylococcus aureus*
- Vancomycin minimum inhibitory concentration (MIC) =4–8 $\mu\text{g/mL}$
- Isolate must be confirmed at MDCH laboratory
- Resistance mechanism is not transferrable to susceptible strains and is usually associated with vancomycin exposure



MDR GNB

- Multidrug-resistant gram-negative bacilli
- Can refer to various organisms:
 - *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, *Stenotrophomonas maltophilia*, *Burkholderia cepacia*, and *Ralstonia pickettii*

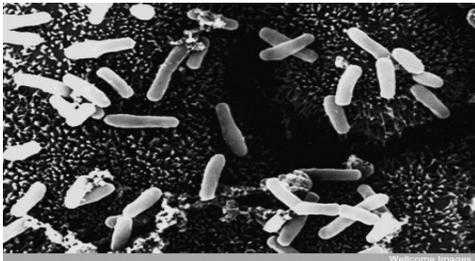


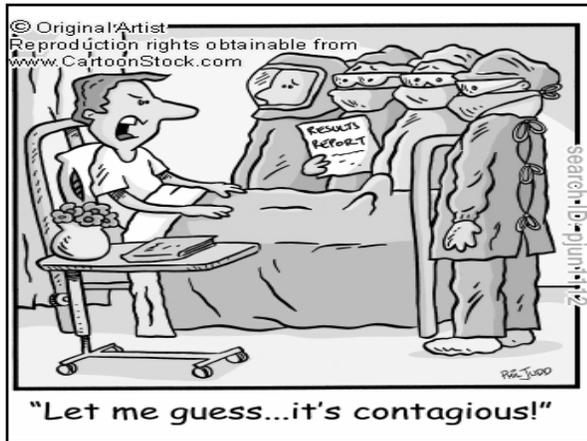
MDR GNB

- Grouped according to resistance
 - Extended-spectrum β -Lactamases (ESBLs)
 - Carbapenem-resistant *Enterobacteriaceae* (CREs)
 - Carbapenemase-producers (such as *Klebsiella pneumoniae* carbapenemase, KPC)
 - Metallo-beta-lactamase (MBL)-producers
- Worrisome public health threat



What about *Clostridium difficile*?





VRSA in the United States

Case No.	State	Date
1	Michigan	June 2002
2	Pennsylvania	September 2002
3	New York	March 2004
4-6	Michigan	February, October & December 2005
7	Michigan	October 2006
8, 9	Michigan	October & December 2007
10	Michigan	December 2009
11, 12	Delaware	April & August 2010



Clostridium difficile



Imported CREs in America



Risk Factors for Acquisition

- Existing severe illness
- Underlying disease or condition
- Invasive medical procedures
- Repeated contact with healthcare system
- Prolonged hospitalization
- Previous colonization with a MDRO
- Elderly and immuno-compromised



Routes of MDRO Transmission

- Contact
 - Person to person, with or without a vehicle
 - Most MDROs
- Droplet
 - Respiratory droplets ($>5 \mu\text{m}$) to host mucosa over short distance
- Airborne
 - Small particles ($\leq 5 \mu\text{m}$) infective over time and distance



Standard Precautions — a Pre-Isolation Step

- All blood, body fluids, secretions (except sweat), nonintact skin, and mucus membranes assumed infectious
- Includes hand hygiene, appropriate gloves/gown/mask/face shield when necessary, and safe injection practices
- Because colonization with MDROs is often unrecognized, standard precautions have an **ESSENTIAL** role in preventing MDRO transmission in ALL healthcare settings



Contact Precautions

- For infections spread by contact and patients with excessive wound drainage, fecal incontinence, or other bodily discharges
- Gown and gloves for every interaction with the patient or potentially contaminated environment
- Q: When to don?
 - A: Upon room entry!
- Q: When to doff?
 - A: BEFORE exiting the room (and hand hygiene immediately upon exiting room)!



MDRO Patient Placement

- Single-patient rooms
 - Airborne Precautions
 - Preferred for Contact and Droplet Precautions
- Cohort MDRO patients
 - By MDRO
 - With patients at low-risk for acquisition and adverse outcomes, and short stays



Duration: An Unresolved Issue

- Outbreaks
 - Indefinite precautions for all previously infected and known colonized patients
- May be prudent to assume permanent colonization
 - Colonized patients who are not decolonized should remain under Contact Precautions for the duration of stay
- Alternatives
 - Once the patient is off antibiotics and has no clinical evidence of clinical infection, 3 or more negative surveillance cultures over 1–2 weeks
 - Interval (6–12 months) free of hospitalizations, antimicrobial therapy, and invasive devices





Current MDRO Surveillance

Michigan Reporting Requirements for MDROs

- Methicillin resistant *Staphylococcus aureus* (MRSA) outbreaks
- Vancomycin-intermediate and -resistant *Staphylococcus aureus* (VISA/VRSA)
- Invasive *Streptococcus pneumoniae*, susceptible and drug-resistant
- Unusual occurrence, outbreak or epidemic of any disease or condition
 - Includes healthcare-associated infections (HAIs)
 - Includes epidemiologically significant organisms
 - Carbapenemase-resistant *Enterobacteriaceae* (CRE)



New Surveillance Initiative

- Formation of SHARP Unit in 2009
- Surveillance of healthcare-associated infections and MDROs through voluntary participation of Michigan hospitals
- Data collected from National Healthcare Safety Network (NHSN)
- Currently, 43 participating hospitals sharing data with SHARP Unit



Prevention Collaborative

- **GOAL:** To implement evidence-based infection control measures for purpose of reducing infection rates in hospitals.
- **Partnering with existing collaboratives**
 - **MHA Keystone: HAI, Catheter-Associated Urinary Tract Infection (CAUTI) Initiative**
 - **MPRO: MDRO/MRSA Initiative**



Future Prevention Collaboratives

- **MRSA/CDI in acute, long term care, and long term acute care facilities**
- **SSI in acute and ambulatory surgical centers?**
- **CRE in acute, long term care, and long term acute care facilities (grant application pending)**



MDCH HAI Website



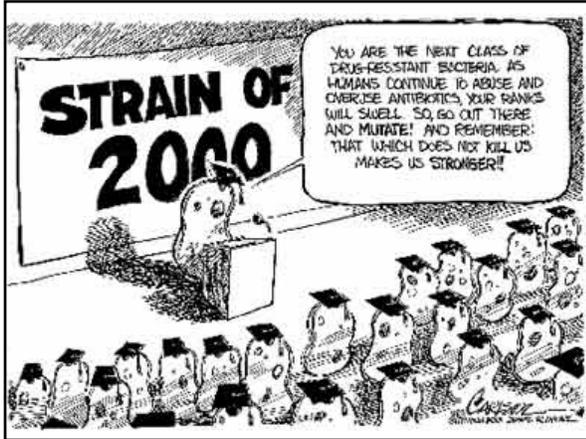
- www.michigan.gov/hai
- **Recent postings:**
 - MRSA discharge data study
 - Comprehensive and targeted documents
 - Annual and Quarterly Reports
 - Sample facility report
 - Frequent updates
 - **RESOURCES**



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Questions?